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children to "go in" for a scholarship and pass the preparatory examination, viz., personal vanity. The parents wish to know that their offspring excel others in their intellectual faculties and to have the fact publicly proved. They have a feeling that their children's honours reflect on themselves, and they are willing that a sacrifice should be made for that end. But can it be said that this is a right or moral motive?

In conclusion, I wish to point out an argument which, if duly considered, raises the whole question to a higher level, and that is in holding up these rewards as the object of work does it not modify and indeed completely annul the high ideal of work, which all thoughtful and religious-minded teachers, whoever they may be, strive to instil into their pupils? If they teach with their lips that the reward of work is neither material nor direct and ought not to be sought after with a commercial spirit, but that it is an invisible indirect one to be won "by losing all," how can that be consistent with working for the sole object of getting a tangible reward?

Therefore the system gives children a wrong and false idea of education and therefore of life. For education is a most important part of life. Thoughtful teachers acknowledge that examinations for scholarships are neither good nor right, but they say they know of no alternative. Miss Mason, with her wide knowledge and experience in all things educational, has endeavoured to solve the problem and with the most successful results. In her *Parents' Review* Schools she has done away with all examinations for any rewards, hence there is "no cram" in them, no strain, but delight is taken in work on higher and more intellectual grounds, and knowledge is acquired without undue effort. And now, as Milton says in his *Tractate of Education*, "I shall detain you no longer in the demonstration of what we should not do," but hope that I may have "pointed ye out the right path of a virtuous and noble education," however imperfectly.

C AGNES ROOPER.

THE DANDELION.

BY MRS. USSHER.

THE first thing to notice about a dandelion plant is the star-like grouping of the leaves; not round the root as you might imagine at first sight, but round a very stunted stem. This stem is like a continuation above ground of the long pointed root, and the leaves cover it completely, lapping round it and round each other with broad white enlargements of the leaf stalks. These latter are like waterproof sheets which prevent wet from soaking into the centre of the plant. Here the branches of the star meet and form a cradle for the baby buds—it is very important they should be kept warm and dry. But their heads are bare, you will say. The waterproof sheets go all round, but above the buds are unscreened and every leaf forms a gutter for water; why does not the cradle become a tank, and how do the baby buds escape drowning? You need only put a pinch of small shot over the leaves to see how it collects towards the centre just as drops of rain will do; and you can see the same thing happen in all similar cases where there is a single root going down into the earth. When, on the contrary, a number of roots spread about, the rain channels are so contrived that the water drops off the tips of the leaves on to them. So that roots, whether long or spreading, get the benefit of all the rain that falls on the plant. All very well for our dandelion's tap root; but still, what about the buds above it? If I tell you that the buds are wrapped in a great hairy blanket which turns the wet, you will not believe me. You do not see it when you look at the plant as it squats on the ground. Ah, but that lazy inspection will not do. Root a plant up, pull the leaves off, waterproof wrappings and all, and behold! the buds which seemed to grow out of the leaves have really got stalks of their own—quarter-of-an-inch long sometimes—and these stalks are thickly covered with white fluff, which rises like a great woolly wrapping round the necks of the buds. It is just as if you wrapped yourself up in a blanket so that nothing could be seen except the crown of your head from above.

These baby buds vary a good deal in colour; sometimes they are almost black, and the surrounding leaves, if growing in exposed places, are often reddish and very much cut, suggesting the lion's tooth from which the plant is called. On the other hand, in shady sheltered places, the leaves are generally less toothed, especially towards the base, and the green is full and rich. As to the flower, the one which comes "very early in the year has a thickness of hue which is not interesting; in autumn the dandelions quite change their colour and are pale." This was written by one of the most accurate and keensighted people who ever lived (R. Jefferies); but he mistrusts his eyes when he attempts to describe the colour of the dandelion. It is "thick" or "pale," yes! but "thick" or "pale" *what*? You will say "Why, yellow," of course. But unless you have better eyes than Richard Jefferies you are wrong. Writing about the big dandelion of May he says: "It is not yellow, nor orange, nor gold; put a sovereign on it and see the difference. They say the gipsies call it the Queen's great hairy dog flower—a number of words to one stalk; and so, to get a colour to it, you may call it the yellow-gold-orange plant. In the winter, on the black mud under a dark, dripping tree, I found a piece of orange peel, lately dropped—a bright red orange speck in the middle of the blackness. It looked very beautiful, and instantly recalled to my mind the great dandelion discs in the sunshine of summer. Yet certainly they are not red orange. Perhaps, if ten people answered this question, they would each give different answers. Again, a bright day or a cloudy, the presence of a slight haze, or the juxtaposition of other colours, alters it very much; for the dandelion is not a glazed colour, like the buttercup, but sensitive. It is like a sponge, and adds to its own hue that which is passing, sucking it up."

Who would guess that this blazing sunlike flower was once packed away in a currant-sized bud? Look at one of the babies again and notice the dark green or black lines which meet in the centre of its crown. They mark the edges of covering leaves; underneath are more, and, inside of all, the whitish threads which shall one day form the gorgeous disc. Lay one of these little threads beside a big yellow ray-like leaf out of a full-blown flower. You will wonder very much how one ever becomes the other. Notice how the ray-like leaf curls into a tube at the base; how the tube contains another tube and that again a forked tongue; how all emerge from a little thing like a shuttlecock which they appear to grow out of. Your only chance of guessing the real nature of these things is to pull them to pieces very carefully, comparing them all the while to the parts of some much simpler flower, like a geranium, bit by bit. First of all, pull away the shuttlecock hairs. They correspond to the green outer covering or cup-leaves of the geranium. Then divide the tube of the yellow ray carefully by tearing it from top to bottom, but without tearing off the bottom of the shuttlecock, for if you did that you would, at the same time, pull away what the tube surrounds. The yellow ray with its tube corresponds to the red (crown) leaves of the geranium. If the geranium's green (cup) leaves were reduced, like early horseradish shoots, to ribs, they would be on their way to becoming hairs; and if the red (crown) leaves were joined, except at their tips, so as to form a tube, you would see an enormous first cousin to the little yellow rays or florets which go to make up a dandelion flower. Now it will not be very hard for you to guess what the tube inside the tube is. The dust threads of the geranium are separate from each other, but if they were joined at their edges they would make a tube like the one in question, only bigger, and its ten parts would be of a different colour and shape to the five parts which make up the inner tubes of dandelion florets. Split one of the latter carefully so as not to break anything inside. What do you find? A tiny "dust shoot." It takes the dust down to a single seed buried in the bottom of the shuttlecock. The "cock" is a pretty things with four ribs which end by overlapping each other like the scales of a fish or a serpent. It will be difficult for you to dig the seed out of it. Wait till summer, and in the meantime soak one of the brown things off a ripe sunflower head. I daresay you thought each brown thing was a seed, but that is not so. The real seed is inside and, after a soaking in water, may be picked out easily in spite of the tiny stalk which fastened it. Down the sides of the seed proper run two threads, which join at the bottom. After the dust* had shot down the dust shoot it entered these threads and ran on down them till it reached the mouth of the seed and fired it with life.

The sunflower, like the dandelion, and like their thousand relations, is made up, not of a flower with many seeds, nor of a seed with one flower, but of a whole colony of tiny flowers or florets, each with its single seed. There are as many as two hundred such tiny florets living together side by side on the platform stretched over the hollow stalk of a dandelion. They do not push or crowd each other, but arrange themselves on a plan, each keeping its place. The plan is made up of curved lines, a double set of them whirling round in opposite directions to each other; and where these lines intersect the florets grow. As the colony gets old the seeds swell, and the little platform gets slightly bossed or (less often) slightly hollowed. This gives more standing room. You can stick a greater number of pins into a round cushion comfortably than you can into a flat one.

You have seen the places the dust travels down; you have not heard yet how it gets from the bags on the threads to the dust shoot. In the first place, take a good look at the latter; it is split at the end and a magnifying glass will show you that it is covered on the outside of the split parts with little hairs which slant upwards. The split end does not separate, however, till after the floret opens; at first it looks like a hairy spike and is hidden away inside the tube made by the dust threads. It is growing all the time and very slowly pushes its way up the tube. The dust threads are ahead of it for they are full grown already; the dust is bursting out from the inner seams of the bags. Perhaps you will think it wasteful that all the dust should fall into the tube and lodge there. To be sure some of it gets mixed up with the hairs on the dust shoot, but at first sight there seems no point in that. For the dust cannot travel down the shoot unless it starts from the inner faces of the fork, and the fork is closed up. But wait a bit. Presently the dust shoot attains its full length, the floret expands, honey rises into the top part of the tube formed by the dust threads, and above it may now be seen the open fork of the dust shoot. The dusty hairs lie out of sight, on the under surface of the branches of the forks. This is the season for insects to come along, and ninety-three different kinds of them have been known to visit the dandelion. The honey in the inner tube is easy to get and there is plenty of it. But they cannot reach it without brushing beneath the dusty hairs we have described. They get covered with the dust themselves, and while they roll and tumble amongst the forest of forked tongues around, the dust is sure to reach the right place for beginning its travels downwards to the seeds.

Well, that is all very well, but how about the flowers which come out too early or too late in the year to be sure of getting visits from the little winged dustmen? We must go back to the hairs on the dust shoot for an answer. After the florets begin to wither the forks turn and twist and interlock with each other; and so the dusty hairs brush against the inner surface of branches around; or branches as they curl brush up dust which has been left clinging to the edges of the tubes (Kerner). Or, most curious of all, the forked tongue of a dust shoot may lick the dust off its own under surface. If your tongue grew very long and curled one-and-a-half times round, the top of itself would come against the bottom of itself, and this is what happens in the case of the dandelion dust shoot; only its extremity is forked like a snake's tongue, and the process, therefore, is doubled.

I have told you now about four contrivances for enabling the dust to get to the dust shoot. One might think that these were enough to account for the number of seeds which a dandelion manages to ripen, but cautious nature has yet another, which at the same time ensures the dust being kept dry. Nature generally feeds at least two birds with one worm. In dull weather and at night (or rather long before night) the flowers close. The dust shoots, instead of leaning out, lean in, the older ones with their split ends covering the young florets in the centre of the flower where the dust is only just ready. If the dust bags were all to split at the same time the colony would be very dependent on the winged dustmen for their services. But the different ages of florets in the same colony, their closeness to each other and their relative position, all tend to scatter dust in the necessary quarters.

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* Or rather, to be quite accurate, an emanation of the dust.

But the opening and closing of the dandelion (and of other flowers) has generally more meanings than one. When the closing is a result of fading, and the flower mimics the bud, insects make no vain journeys. The flower has closed its signals and hauled down its flag. Flowers no more fade vainly than they open and close vainly; there is a use not only in these things, but in the ways and seasons of them. The "Father of Botany" (Linnæus) thought it worth while to keep a "flower clock." It was not altogether an easy task, for plants like human beings vary their hours of going to bed and getting up according to the time of year, and like lazy and unprincipled human beings, according to the weather also. He discovered, however, that allowing for everything, the dandelion at Innsbruck, in Germany, gets up in June between six and seven in the morning, and that much further north, at Upsala, in Sweden, it opens an hour earlier. This seems odd till we remember the early sunrise in Sweden. The Swedish flower colony makes up for its energy by closing between eight and ten in the morning, whereas at Innsbruck it does not go to bed till between two and three in the afternoon. What does the dandelion do in England—have any of you noticed? It will not do to make a guess by remembering the behaviour of any of its many near relations; some are much lazier, some much more energetic than the dandelion. These opening and closing movements continue as long as growth lasts. When the flower colony fades a whole chapter of growth comes to an end, and the green flower leaves close for a long time. Under their kindly shelter the seeds ripen. The narrow neck between the hairs of each little shuttlecock and its base get longer and longer; the yellow ray-like leaf gets pushed higher and higher. When the outside flower leaves first close, these shrivelled rays show between their tips, but at last the growing shuttlecocks push them out of the green dome; they fall right off, their work is done.

So soon as the seeds are ripe the green leaves part; the

neck of each seed vessel has grown to twice the length of the shuttlecock-like base; above the closed hairs open; they spread abroad, and in between them you see the little scar left by the dust shoot and another left by the yellow ray. With a magnifying glass you can perceive that each hair is fringed like a feather; the resemblance to a shuttlecock would be very complete but for the lengthened neck. A shuttlecock's feathers, however, are stuck in upright, and these do not remain upright, but, as said above, they flatten out and meet neighbouring hairs; and they completely hide the colony's platform. You look down on a dome of glittering silver stars. It is the clock, which as children you all have blown, little thinking when you did it that you were helping nature to sow the dark earth with the golden suns of another year. Leave the seeds to take care of themselves, and in the words of a loving old French botanist: "The sails are spread—they are ready to start—the air shall be their ocean; the slightest breeze shall launch them; . . . . they shall not touch earth until they have navigated afar and travelled great spaces." Their means of transport saves them, and justifies the labour, the many safeguards, for their development. If they were all to fall at the feet of the plant-mother they would choke each other and perish.